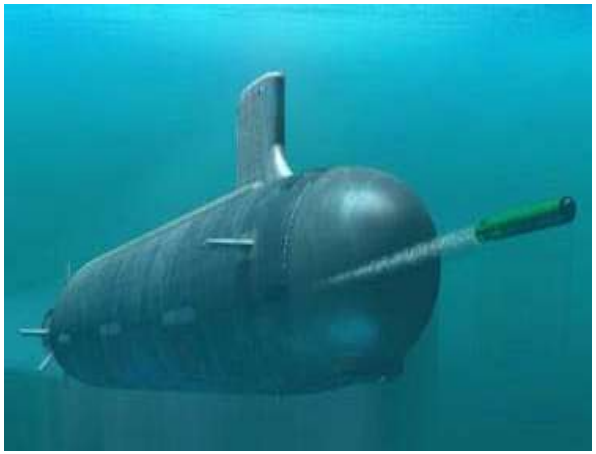
CelerisSystems[SM]



Photo's courtesy of US DoD

Automated tracking and reporting of KPPs, TPMs and other key measures

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Mike Biss
Vice President/ Chief Technology Officer (CTO)
Celeris-Systems
(714) 345-9840

3335 E. Miraloma Ave., Suite 143
Anaheim, California 92806

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The Challenge- How Does T&E Ensure the Capability Required Will be Delivered

- Required capability is defined at the onset
- The SE process applies special tagging to help assess the requirements
- Programs assign special interest areas to groups of requirements
- The T&E community utilizes the TEMP to define their needs
  - Predict performance/ capability being delivered
  - Inform milestone events and decisions
- Programs are dynamic, TEMPS aren't, so how do the T&E stakeholders maintain insight into what performance/ capability will be delivered

Event Based Planning (EBP) defines a method to track, assess & report the performance to be delivered

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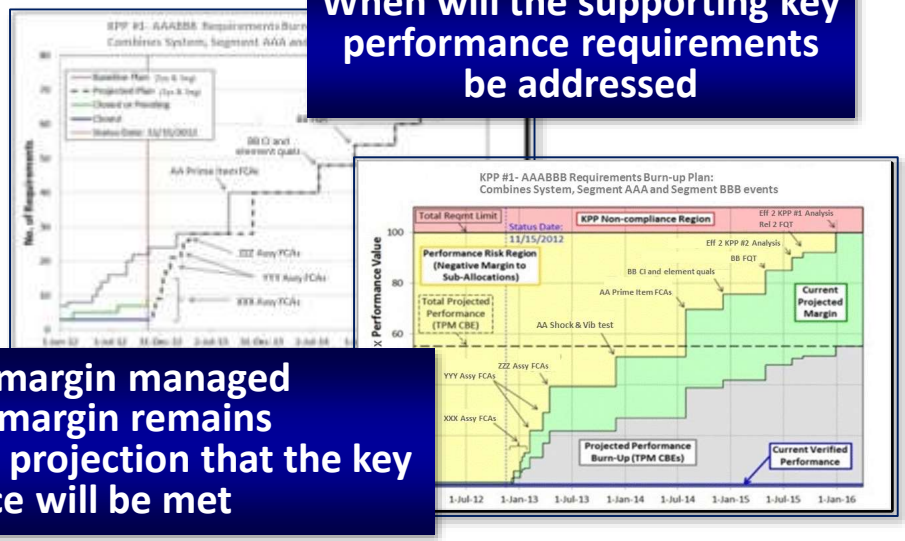
Understanding What Capability is to be Delivered and When is Critical

- **Simple stoplight charts are convenient for management, but…..**
- **What data and information does the technical community use to ensure accurate reporting/forecasting**
- **How much effort is required to track & report predictions**

Stop light charts

System KPP/KSA status									
KPP/KSA	ID	Performance measure	Event1	Event2	Event3	Event4	Event5	Event6	Event7
			XX/XX/XX	XX/XX/XX	XX/XX/XX	XX/XX/XX	XX/XX/XX	XX/XX/XX	XX/XX/XX
X.X.X	KPP-1	Key Parameter #1	→	→	→				
Y.Y.Y	KPP-2	Key Parameter #2	↑	→	→				
Z.Z.Z	KPP-3	Key Parameter #3	↓	↑	→				
A.A.A	KSA-1	Key Attribute #1	→	→	↑				
B.B.B	KSA-2	Key Attribute #2	→	→	→				
C.C.C	KSA-3	Key Attribute #3	→	↓	→				

When will the supporting key performance requirements be addressed



- How is the margin managed
- How much margin remains
- What is the projection that the key performance will be met

In todays complex systems and system of systems, automated tracking and predictions of key requirements is essential

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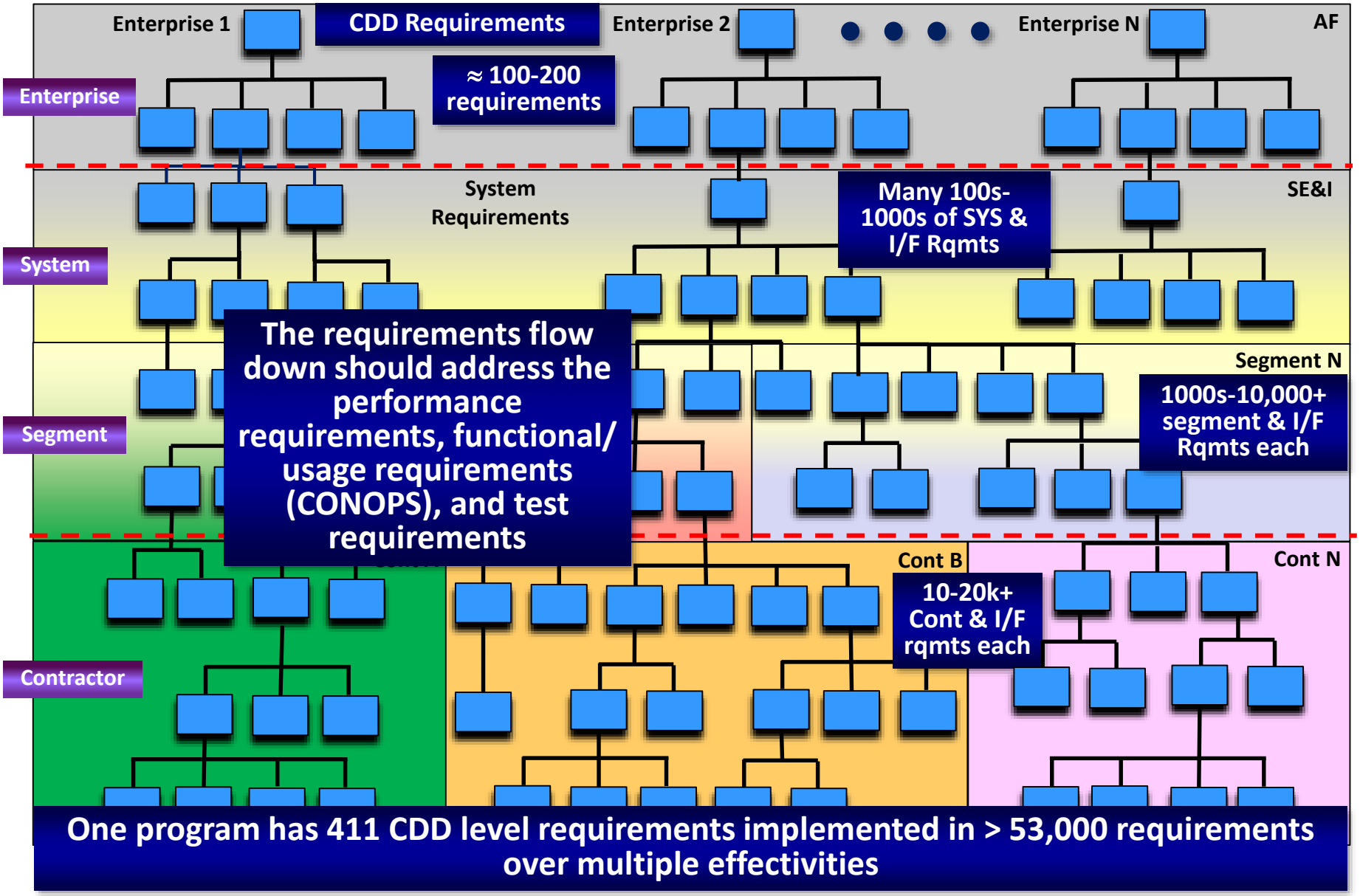
Top to Bottom Requirements Decomposition Critical to System Definition



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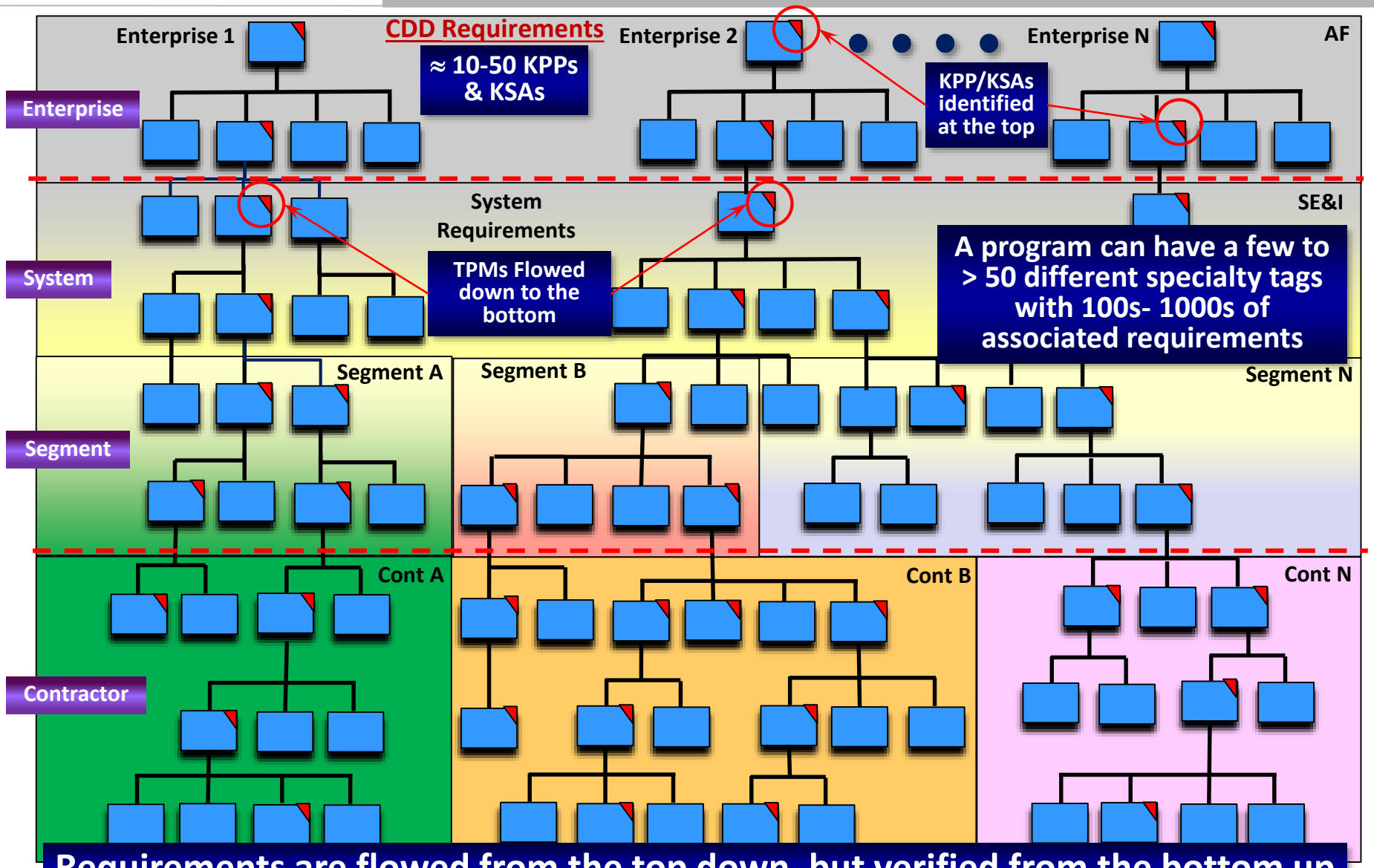
Specialty Tagging of Requirements From Top to Bottom Ensures Hierarchical Understanding



Requirements are flowed from the top down, but verified from the bottom up

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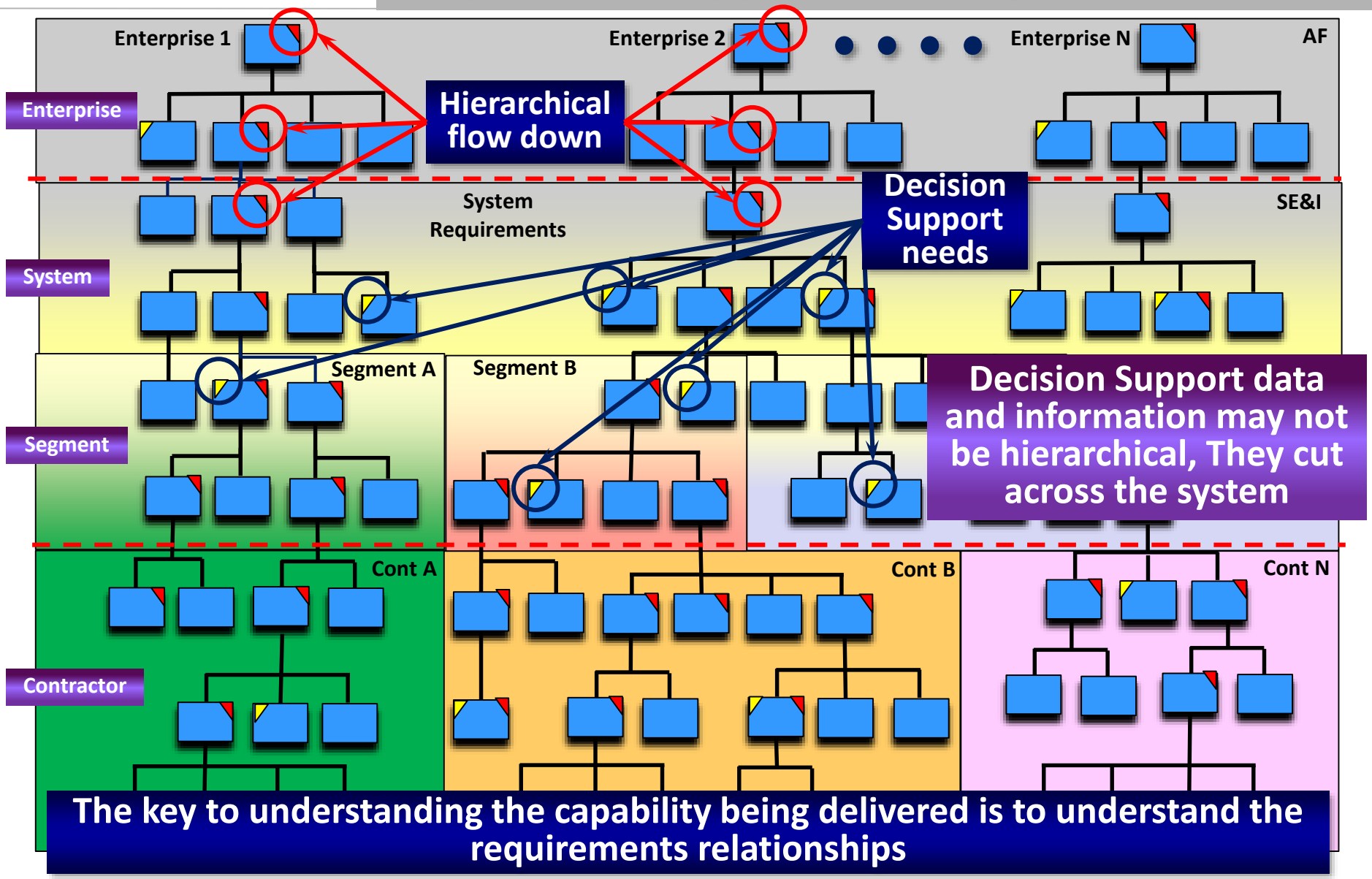
Specialty Tagging of Requirements Also Required to Support Cross System Evaluation



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Understanding Key Requirements Goes Well Beyond KPPs, KSAs, and TPMs

Requirements based parameter
Key Performance Parameters (KPP)
Key System Attributes (KSAs)
Additional Performance Parameters (APA)
Measures of Effectiveness (MOE)
Measures of Suitability (MOS)
System Technical Performance Measures (TPM)
Satellite Technical Performance Measures (TPM)
C2 system Technical Performance Measures (TPM)
Mission Planning Technical Performance Measures (TPM)
System Critical Technical parameters (CTP)
Satellite Critical Technical Parameters (CTP)
C2 system Critical Technical Parameters (CTP)
Mission Planning Critical Technical Parameters (CTP)

Hierarchical Requirements

Decision support parameter
Critical Operational Issue (COI)
IOC/FOC Decisions
Evaluation framework decisions supported
Operational capability
Decision Support Questions (DSQ)
Developmental Evaluation Objectives (DEO)
Acquisition Decisions (AD)
Developmental Evaluation Framework- Cyber security (DEF) issues
Cyber technical capabilities
Evaluation activity categories
Development Test Objectives (DTO)
System capability decisions
System Capabilities (SC)
Mission critical

Unique grouping of Requirements

Availability
Effectivity
Release
Epoc, phase, sprint

Special interest area
Cyber/IA
Survivability
Reliability
Safety
Security

V&V type
Design verification
Acceptance verification

V&V status
Verification
Validation/ Risk reduction
Partially verified

Baseline type
Technical baseline
Contract baseline

Requirement type
Performance rqmt
Functional/ usage rqmt
Test rqmt

Sys Funct Category
Performance
Reliability
Interoperability
Cybersecurity

Unique grouping of Requirements

One program's TEMP includes > 48 tables with 109 evaluation combinations addressing >3400 requirements-

Very complex challenge to maintain insight, even more so in a dynamic environment

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Correlation of Requirements to Events with Specialty Tagging Provides Critical Insight

The Test and Verification Evaluation Matrix (TVEM)
correlates the requirements to the events

SE

Key SE information captured
- Rqmt info
- Planned Verification method (VCRM)
- Specialty tagging- KPPs, KSAs, TPMs, Cyber/ IA, ilities, DEO, mission critical info, etc
- Effectivity

T&E

Key T&E Event info captured
- Event unique ID
- Event title
- Responsible org & engineer

10s- 100s Events captured in the TVEM
- Risk reduction events, exercises & demos
- Segment events
- System/ enterprise events
- DT&E Events (if desired)
- OT events (if desired)

Clear understanding of what is to be verified, validated, or assessed in each event

No of times the rqmt is addressed

No of rqmts addressed in an event

CDD Spec

Sys Spec

Seg

Seg

Seg Spec

ICD

KPPs, TPMs, Cyber/ IA, ilities, etc tagged, tracked & reported

Formal verification

Unique tagging of KPP/TPMs helps ensure the capability required is delivered

Requirements allocated to events

Time phased completion metrics provided to help define progress to plan

Many 100's to 1000's of system level requirements captured in the TVEM for first major milestone

Event Based Planning (EBP) Ensures Compliance with DoDI 5000.02

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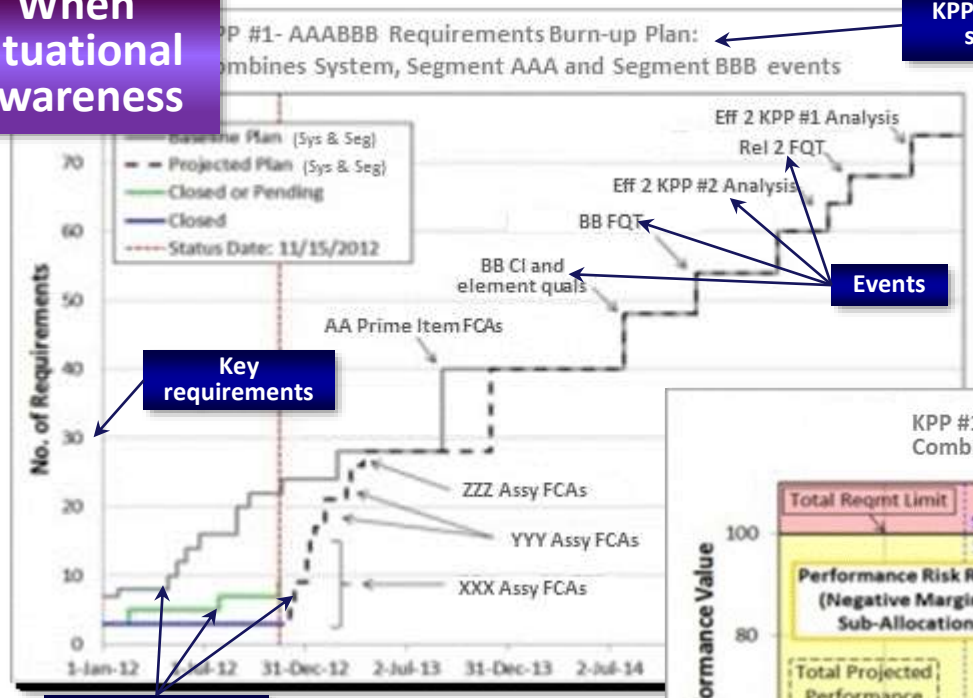
Tracking and Reporting of Key Parameters is Automated

"When" Situational Awareness



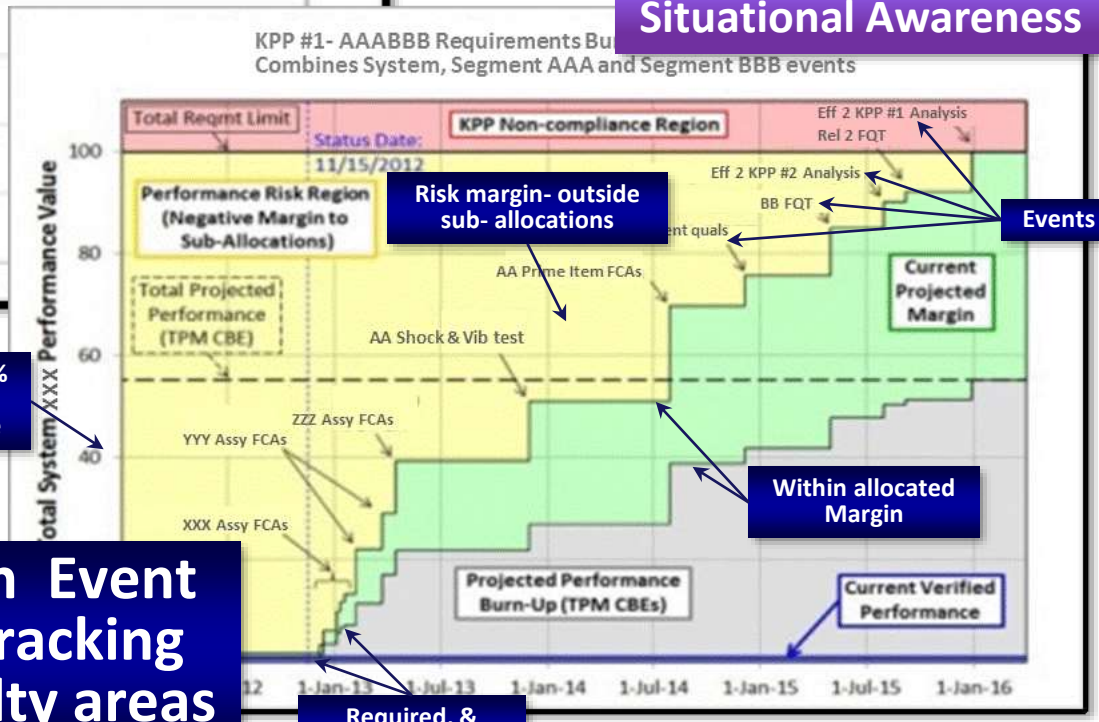
KPP, KSA, or any other specialty tagging

Events

Key requirements

Plan, actual, & forecast dates

"Capability to meet key requirement" Situational Awareness



Risk margin- outside sub- allocations

Events

Key requirements % of allocated performance value

Within allocated Margin

Required, & actual capability

Specialty Tagging through Event Based Planning Enables tracking and reporting of all specialty areas

Key Takeaway

- This looks daunting, managing complex systems and system of systems is tough, but….
- This data and information is already being defined and managed by someone
  - Mostl ikely just spread across multiple organizations/ tools
- Event Based Planning
  - Brings it together into a common database and evaluation framework
- Application of COTs tools and desire to use EBP is all that is required

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Automated KPP/KSA Tracking and Reporting Summary

- The TEMP helps to define what is needed
- Specialty tagging of requirements helps to organize the data to be assessed
- Application of Event Based Planning (EBP)
  - Integrates the SE and T&E communities
  - Utilizes the program data for statusing/ reporting
  - Correlates the data and information from across all of the specialty tagging
  - Enables each stakeholder to get to the data/ information they need quickly and accurately
  - Brings the development, DT and OT communities into a common data base and assessment framework
- Ensures compliance to DoDI 5000.2

EBP can be implemented as a COTS tool and implemented at the start of a program or while in execution